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# Chapter Four: Habitats, Fish, and Wildlife

## Table of Contents

	<b>Page</b>
A. Habitats .....	4-1
B. Fish and Wildlife Populations .....	4-3
1. Fish and Shellfish .....	4-3
2. Birds .....	4-8
3. Mammals .....	4-11
C. References .....	4-16

## List of Tables

<b>Table</b>	<b>Page</b>
Table 4.1. Special status species found in the license area. ....	4-2
Table 4.2. Estimated chum salmon escapements in thousands of fish for major spawning systems in Kamishak Bay District of the Lower Cook Inlet Area, 2008-2012.....	4-3
Table 4.3. List of shorebirds surveyed in the Cook Inlet area.....	4-9

## List of Figures

<b>Figure</b>	<b>Page</b>
Figure 4.1. Map of northern region of ADF&G's Game Management Unit 9.....	4-4
Figure 4.2. Map of Southwest Cook Inlet exploration license area highlighting surrounding anadromous streams .....	4-5
Figure 4.3. Portions of the critical habitats of the beluga whale and Alaska Southwest distinct population segment of the northern sea otter that overlap the license area .....	4-15



# Chapter Four: Habitats, Fish, and Wildlife

This chapter considers and discusses the license area’s habitats, fish, and wildlife populations, as required by AS 38.05.035(g)(iii). This chapter is not intended to be an exhaustive examination of all habitats and fish and wildlife species of the area, but rather, the director has limited the scope of the administrative review and finding to considering and discussing those that have important subsistence, recreational, or commercial value, and that are material to the determination of whether the proposed exploration license will best serve the interests of the state (AS 38.05.035(e)(1)(B)).

## A. Habitats

According to the Environmental Protection Agency (EPA) the license area lies within the Alaska Range Level III ecoregion (EPA 2013). This ecoregion had extensive glaciation during the Pleistocene epoch that carved U-shaped valleys into the mountains (Gallant et al. 1995). Volcanic activity and ocean storms have shaped the landscape. Deeply cut fjords along the Gulf of Alaska coast are composed of intertidal and sub-tidal algal forests, with kelp attached to rocky substrates. The interior lowlands contain mixed forests of black or white spruce, balsam poplar, black cottonwood, paper birch, and quaking aspen. The semiarid alpine tundra habitat supports low shrubs, lichens, mosses, and grasses (ADF&G 1985; ADF&G 2006). The landforms, vegetation types, streams and wetlands, and marine waters of the license area provide habitat for fish, birds, and wildlife. Streams and rivers feed into Cook Inlet.

Iniskin and Chinitna bays contain sheltered tidal flats habitat. This unvegetated habitat is sheltered from strong tidal currents and dominated by a soft, muddy substrate. This habitat also supports large populations of benthic organisms, which are an important food source for birds and fish. Chinitna Bay’s exposed tidal flats are also unvegetated, but the substrate is dominated by sand. Large populations of shellfish occur in this habitat and it is an important resting and feeding area for birds, fish, seals, and sea lions. Iniskin, Oil, and Chinitna bays all have marsh habitats lining their inner coasts, colonized by perennial vascular plants that can tolerate the waterlogged soils. Many species of fish and wildlife use these areas to feed (NOAA 2002). Coastal wetlands, lagoons, and bays provide staging areas for large seasonal aggregations of waterfowl and shorebirds (ADF&G 2006).

The license area includes a number of freshwater habitats such as small ponds and wetlands (USFWS 2014b). Streams draining into the Gulf of Alaska are short with steep gradients and carry heavy glacial sediment loads (CEC 2011). They are fed by the glaciers on top of the surrounding mountains and volcanoes (Gallant et al. 1995).

The license area’s higher elevations support dwarf scrub communities, and lower elevations have low scrub communities. Tall scrub communities are found at low elevations along hill-slope drainages (Gallant et al. 1995). The lower slopes and valley bottoms support shrub communities of willow, birch, and alder (CEC 2011).

The northeast portion of the license area is adjacent to Lake Clark National Park and Preserve. Boreal forests dominate the southern portion of the park and preserve which are dominated by white spruce mixed with black spruce and birch (NPS 2014). Oil and gas exploration and development are not allowed in U.S. national parks and preserves.

## 1. Designated Habitat Areas

Several designated habitat areas are located near and within the license area.

**a. Lake Clark National Park and Preserve**

The license area borders the federal Lake Clark National Park and Preserve. This park contains mountains, volcanoes, rivers, lakes, and many fish and wildlife resources. Research has shown that people have been living in this region since the last ice age, approximately 12,000 years ago (NPS 2014). The park is managed under the National Park Service, with authorities from 36 CFR parts 1-199 (national parks); 36 CFR part 13 (Alaska national parks), and the Superintendent’s compendium.

**b. Alaska Maritime National Wildlife Refuge**

The license area coincides with the marine waters refuge in Cook Inlet. The national refuge was created to conserve marine mammals, seabirds, migratory birds, and the resources in these marine habitats. The refuge also provides continued opportunities for subsistence uses by local residents. The refuge is managed under the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) (USFWS 2013). Exploration for resources is regulated under federal laws and regulations.

**2. Critical Habitats and Special Status Species**

The State of Alaska, Department of Fish and Game (ADF&G) is responsible for maintaining and determining a list of endangered species in Alaska. The state considers a species endangered when the Commissioner of ADF&G determines the species population has decreased to such an extent as to indicate its continued existence is threatened (ADF&G 2014e).

On the federal level, under the Endangered Species Act, a species is listed as endangered if it is in danger of extinction throughout all or a significant portion of its range. It is listed as threatened if it is likely to become an endangered species within the foreseeable future. Listing a species makes it illegal to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect that species (NOAA 2013b).

Ten species inhabiting the license area are listed as endangered or threatened on one or both of these lists (Table 4.1). The federally designated critical habitat of the Cook Inlet beluga whale and the the Southwest Alaska Distinct Population Segment (DPS) of the northern sea otter overlap the license area. See the marine mammals section, below, for maps of the critical habitat areas.

**Table 4.1. Special status species found in the license area.**

Species	Special Status	Critical Habitat in License Area
Blue Whale	Endangered	No
Cook Inlet Beluga Whale	Endangered	Yes
Fin Whale	Endangered	No
Humpback Whale	Endangered	No
North Pacific Right Whale	Endangered	No
Northern Sea Otter	Threatened	Yes
Sei Whale	Endangered	No
Sperm Whale	Endangered	No
Steller Sea Lion	Endangered	No
Steller's Eider	Threatened	No

Sources: ADF&G 2014e, NOAA 2013b

## B. Fish and Wildlife Populations

The diverse landforms, vegetation types and abundance of streams and wetlands of the license area provide habitat for a wide variety of Alaska’s game and non-game mammals, fish, and birds. Fish and wildlife of particular importance are salmon, various marine and freshwater fish, moose, black and brown bears, several furbearer species, and several species of whales and other marine mammals. Many species of seabirds, shorebirds, waterfowl, and land birds inhabit the area as year-round residents, summer residents, or spring-fall migrants. ADF&G manages wildlife resources by Game Management Units (GMU). The license area is located in ADFG’s game management subunit 9A (Figure 4.1).

All Alaskans are eligible to participate in subsistence hunts and fisheries. The primary subsistence wildlife species include moose, black and brown bear, Pacific harbor seals, shorebirds, seabirds, and land birds. Common subsistence fish are salmon, halibut, rainbow and steelhead trout, burbot, Dolly Varden, groundfish, Pacific herring, bottom fish, and shellfish. Tyonek is the only population center on the western shore of Cook Inlet that participates in subsistence fishing (Fall 1991; ADF&G 2006; ADF&G 2013).

### 1. Fish and Shellfish

#### a. Pacific Salmon

All five salmon species (Chinook, sockeye, coho, pink, and chum) inhabit the license area and surrounding streams. They migrate from the marine waters of Cook Inlet into license area streams to spawn each year (ADF&G 2014b). There are several anadromous streams in the license area, including: Brown Creek, Bowser Creek, Right Arm Creek, Portage Creek, Wrong Branch Trail Creek, Fitz Creek, Shelter Creek, East Glacier Creek, West Glacier Creek, Silver Salmon Creek, Marsh Creek, Chinitna River, Red River, Clearwater Creek, and Y-Valley Creek (Johnson and Blanche 2012) (Figure 4.2).

The license area is in ADF&G’s Kamishak Bay fishery management district of the Lower Cook Inlet fishery management area. This district includes coastal waters and inland drainages on the western shore of Cook Inlet, south of the latitude of Anchor Point. Two hatcheries supply salmon to the Lower Cook Inlet area. The Trail Lakes Hatchery contributes sockeye and coho salmon and the Fort Richardson Hatchery supplies Chinook and coho salmon (Hollowell et al. 2013).

Only three areas in or near the license area (Ursus Cove, Cottonwood Creek, and Iniskin Bay) are considered major spawning systems in the Kamishak Bay district, and only for chum salmon (Hollowell et al. 2013) (Table 4.2).

**Table 4.2. Estimated chum salmon escapements in thousands of fish for major spawning systems in Kamishak Bay District of the Lower Cook Inlet Area, 2008-2012.**

Spawning System	2008	2009	2010	2011	2012	10-Year Average
Ursus Cove	6.5	12.9	11.8	10.6	2.8	15.4
Cottonwood Creek	11.6	19.4	15.8	4.7	2.8	22.7
Iniskin Bay	20	30.8	19.3	16.5	3	19.3

Source: Hollowell et al. 2013

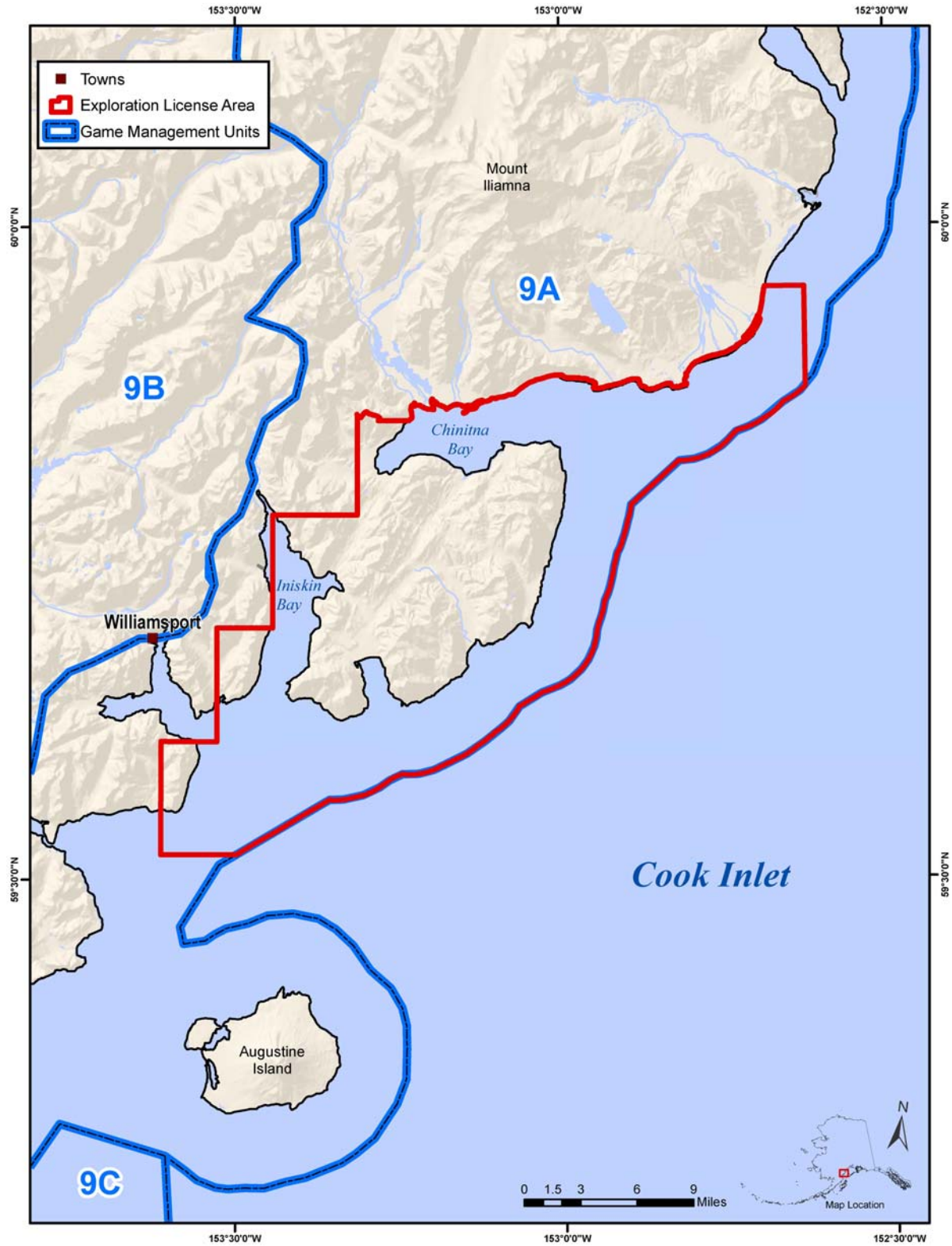


Figure 4.1. Northern region of ADF&G's game management unit 9.

Source: ADF&G 2014c

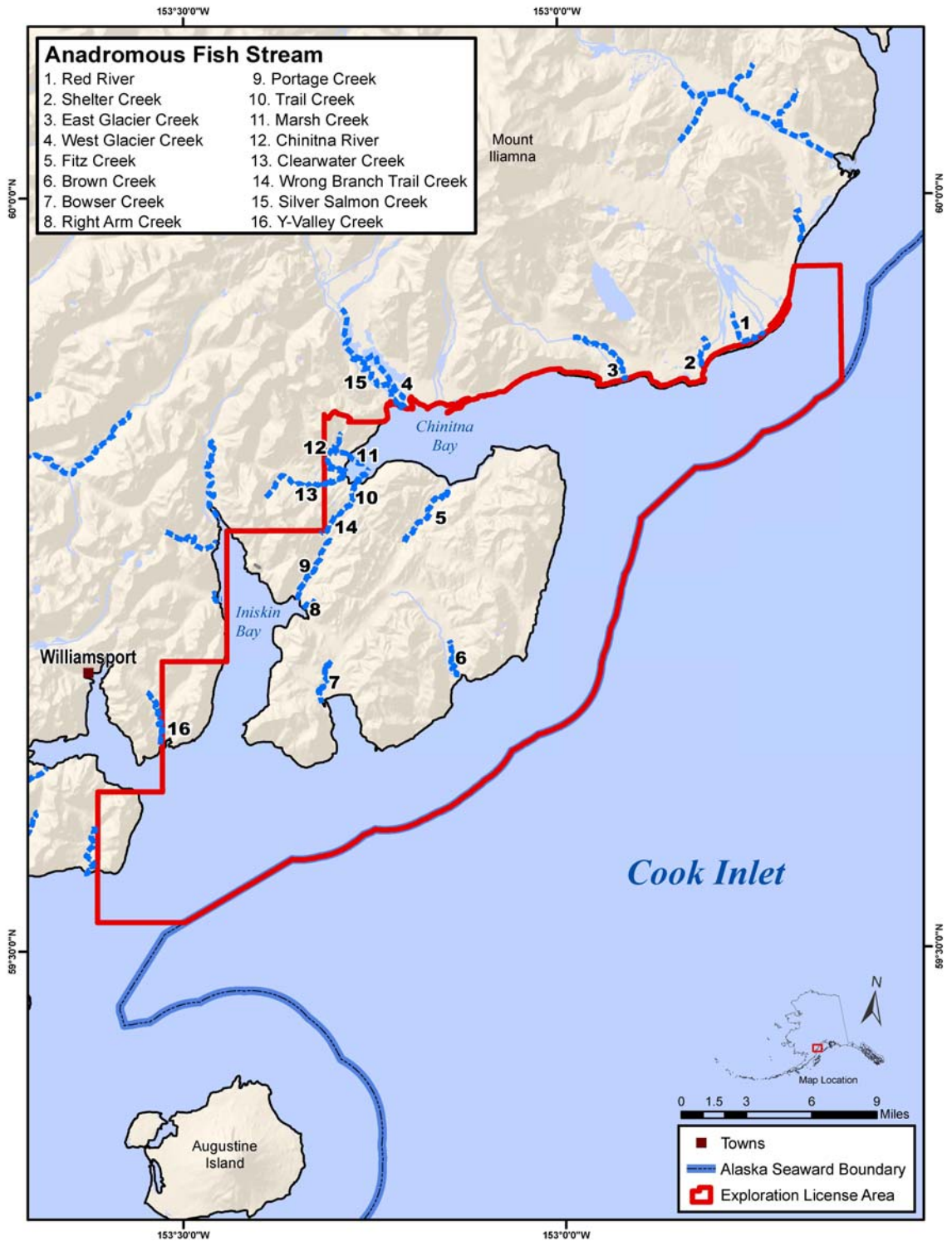


Figure 4.2. Southwest Cook Inlet exploration license area highlighting surrounding anadromous streams.

Source: Johnson and Blanche 2012

***i. Chum Salmon***

Chum salmon spawn in several other freshwater streams in and around the license area, including Brown Creek, Bowser Creek, Right Arm Creek, Portage Creek, Wrong Branch Trail Creek, Fitz Creek, and Shelter Creek and are present in West Glacier Creek, Silver Salmon Creek, Marsh Creek, the Chinitna River, and Clearwater Creek (ADF&G 2014b). The 2012 total chum salmon escapement in Kamishak Bay District index streams was 79,112 fish, which is within the sustainable escapement goal range of 65,550 - 141,600 fish, but below the previous 10-year average of 131,000 fish (Hollowell et al. 2013). Chum salmon return to fresh water to spawn between June and September. Eggs hatch between December and February, and alevin remain in the gravel for two to three months before migrating downstream to the sea. Juveniles remain near shore for several months and then move to the open ocean, where they spend three to four years before returning to their natal streams. Chum salmon feed on insects, diatoms, crustaceans, and fish (ADF&G 1985; ADF&G 2014a).

***ii. Pink Salmon***

Pink salmon spawn in Brown Creek, Bowser Creek, Right Arm Creek, Portage Creek, and Shelter Creek (ADF&G 2014b). There were 35,948 pink salmon counted in Kamishak Bay District index streams in 2012, which is within the sustainable escapement goal range of 25,950 - 203,400 fish, but below the previous 10-year average return of 597,000 fish (Hollowell et al. 2013). Pink salmon return to fresh water to spawn between June and late September. Eggs hatch between late December and February, and alevin remain in the gravel until migrating toward the sea in April or May. Juveniles remain close to estuaries until they are 6-8 cm long, when they move farther offshore to spend 18 months before returning to their natal streams. Pink salmon feed on crustaceans, insects, fish, and squid (ADF&G 1985; ADF&G 2014a).

***iii. Sockeye Salmon***

Sockeye salmon are present in two freshwater streams in and around the license area. They are West Glacier Creek and the Chinitna River (ADF&G 2014b). No hatchery data was available for the sockeye salmon spawning systems within and near the license area, although, the 2012 estimated sockeye salmon escapement for the species' major spawning systems (outside the license area) in the Kamishak Bay District was 21,500 fish, which is below the previous 10-year average of 29,900 fish (Hollowell et al. 2013). Hatchery returns of sockeye salmon in the Lower Cook Inlet management area were below forecast in 2012. Sockeye salmon return to fresh water to spawn between June and July. Eggs hatch during the winter months, and alevin remain in the gravel until the spring when they emerge as fry and move to rearing areas. In systems with lakes, juveniles usually spend one to three years in fresh water before migrating to the ocean in the spring; however, in systems without lakes, many juveniles migrate to the ocean soon after emerging from the gravel. Sockeye salmon feed on zooplankton, small crustaceans, and small fish (ADF&G 2014a).

***iv. Chinook Salmon***

Chinook salmon are present in one freshwater stream (Y-Valley Creek) in and around the license area and migrate through the area. (ADF&G 2014b). No hatchery data was available for the Chinook salmon spawning systems within and near the license area, although, the 2012 estimated Chinook salmon escapement for the species' major spawning systems in Cook Inlet was 5,461 fish (Hollowell et al. 2013). Hatchery returns of Chinook salmon are the largest of all Pacific salmon. They return to fresh water to spawn between May and July. Eggs hatch during the winter months, and alevin remain in main -channel river areas for one year. They spend anywhere from 1-5 years feeding in the ocean and return to their native streams to spawn. Juvenile Chinook salmon initially feed on plankton and later feed on insects. In the ocean they eat a variety of organisms including herring, pilchard, sandlance, squid, and crustaceans (ADF&G 2014a).



**v. Coho Salmon**

Coho salmon are present in eight freshwater streams in and around the license area. They are the Red River, Shelter Creek, East Glacier Creek, Silver Salmon Creek, Brown Creek, Bowser Creek, Iniskin River, and Y-Valley Creek (ADF&G 2014b). No hatchery data was available for the Coho salmon spawning systems within and near the license area.

Coho salmon return to fresh water to spawn from July to November, usually during periods of high runoff. Eggs hatch in early spring, and alevin remain in the gravel until May or June when they emerge as fry and move to rearing areas. They spend 1-3 winters in streams before migrating to the ocean as smolt. Most fish spend 18 months in the ocean before returning as full size adults to spawn. In freshwater Coho fry feed on a variety of insects, plankton, and eggs deposited by adult salmon. In the ocean their diet mainly consists of fish and squid (ADF&G 2014a).

**b. Other Freshwater Species**

Freshwater habitats found throughout the license area support many populations of freshwater fish. These include rainbow and steelhead trout, Dolly Varden, and burbot. Freshwater species may be resident or may migrate to the ocean for part of their lifecycle.

**i. Rainbow and Steelhead Trout**

Rainbow and steelhead trout are the same species with differing lifestyles. Rainbow trout remain in fresh water. They spawn in the spring and may reside in lakes or streams. Steelhead trout spend one to four years in fresh water before migrating to the ocean and later return to their home streams to spawn (Morrow 1980). Rainbow trout occur naturally throughout the freshwaters of the Kenai Peninsula and the Upper Cook Inlet. Rainbow trout and steelhead trout, during their time spent in freshwater, feed on aquatic insects, plant material, salmon carcasses, eggs, and even small mammals. After steelheads smolt and migrate to the ocean, their diet consists of squid, amphipods, and other fish (ADF&G 2014a).

**ii. Dolly Varden**

Dolly Varden spawn in many streams draining into the western side of Cook Inlet (ADF&G 2014b). They may be resident or anadromous. They reside in near shore marine waters and return to deep river pools in their natal streams between late July and November to overwinter. When Dolly Varden mature, between four and six years of age, they spawn between the end of July and the beginning of December. Eggs hatch in March and April, and alevin remain in the gravel for three weeks until emerging as fry. Juveniles remain in the streams for two to four years and then may begin to migrate to the sea to feed along the coasts in the summers. Dolly Varden feed on insects, salmon eggs, small fish, and invertebrates (ADF&G 1985; ADF&G 2014a).

**iii. Burbot**

Burbot are a relatively long-lived species, maturing in six to seven years and often living more than 20 years. They broadcast spawn under the ice in February through March. Burbot are found in clear lakes and glacial rivers within the license area. They feed on insects and other invertebrates but mainly eat fish (ADF&G 2014a).

**c. Other Marine Fish Species**

Marine fish in or near the license area include Pacific herring, eulachon, Pacific sand lance halibut, walleye pollock, Pacific cod, sablefish, and rockfish. Several species of shellfish are found in the area such as crab, shrimp, and clams.

Pacific herring spawning biomass in the Kamishak Bay District has been below the 6,000-ton regulatory commercial fishing threshold since 2001 (Hollowell et al. 2013). Pacific herring live in

coastal waters on the inner continental shelf in the summer and spawn in shallow, vegetated intertidal areas in the spring. They are found from the surface down to 1,300 feet and travel in large schools. Young rear in sheltered bays and inlets and then join adults migrating to deeper waters in the fall to overwinter. Pacific herring feed on crustaceans, phyto- and zooplankton, and small fish (ADF&G 1985; ADF&G 2014a).

Eulachon are an anadromous species that returns to spawn in drainages throughout Cook Inlet in early May. They feed on krill (ADF&G 2014a). Eulachon are important food for marine birds and eagles, fish (including salmon), and marine mammals (including beluga whales) (Armstrong 1996).

Pacific sand lance live in the sandy substrates of the intertidal zone (ADF&G 2014a). They spawn in August through October (ADF&G 2014a, citing to Robards et al. 1999) and feed on phyto- and zooplankton. Pacific sand lance are a key prey species because of their high protein content (ADF&G 2014a, citing to Mabry 2000).

Pacific halibut feed in shallow coastal areas in the summer and move to deep water between November and March, where the mature ones (8-12 years old) spawn. Eggs hatch in about two weeks, and larvae drift with currents until settling in shallow nearshore waters, where they spend 1-3 years. Pacific halibut are generally found between 20 and 1,000 feet deep. They move on and off the continental shelf and feed on plankton, crustaceans, fish, octopus, and clams (ADF&G 1985; ADF&G 2014a).

Walleye pollock occur in large schools, inhabiting waters between 350 and 1,000 feet deep. Spawning occurs in late February through mid-June, when they move high in the water column in shallow waters. They migrate toward the sea bottom in deeper areas in December through February. Walleye pollock feed on planktonic crustaceans, shellfish, and fish, moving near the water surface at night to feed (ADF&G 2014a).

Pacific cod, or gray cod, are important prey for a wide range of fish and marine mammals, including Steller sea lions. They occur in large schools, inhabiting waters between 350 and 1,000 feet deep. They generally reach maturity in 3-5 years and have lifespans of up to 17-18 years. Spawning usually occurs in late winter to early spring (NMFS 2008d; Armstrong 1996).

Sablefish, or black cod, spawn in winter in waters 1,000 to 1,600 feet deep. The larvae live at the surface and drift inshore as they grow. At about two years old, the fish move into deeper waters to sandy or muddy ocean floors (Armstrong 1996). They feed on fish, cephalopods, and crustaceans (ADF&G 2014a).

Black rockfish are found from the surface to 1,000 feet deep but usually stay shallower than 500 feet. They live in large pelagic schools but may rest on the sea floor. Black rockfish give birth to larvae from January to May. They feed on zooplankton, crustaceans, and small fish (ADF&G 2014a).

Shellfish are found in the intertidal, nearshore, and offshore waters of Cook Inlet. Crab (Dungeness, tanner, and golden and red king) are reported to occur in the license area (ADF&G 2014a). Razor clams are found in commercial quantities on the western side of Cook Inlet (ADF&G 1985). Clams are found in fine, soft, muddy areas near river sources and in protected areas of the coastline (ADF&G 2014a). Northern pink shrimp live in lower Cook Inlet in large concentrations (ADF&G 1985). They are found over soft mud bottoms at about 150 to 350 feet. Spot shrimp are bottom feeders. They are usually found at depths of about 360 feet but have a habitat range of 12 to 1,500 feet (ADF&G 2014a). Other shellfish in Cook Inlet include octopus, green urchin, sea cucumber, and scallops (Trowbridge and Goldman 2006).

## 2. Birds

Approximately 450 species of birds are found in Alaska, many of which may be found in the license area. Birds may live in the license area year round, or migrate for breeding or seasonal uses (ADF&G 2006). The tidal flats within Iniskin and Chinitna Bays are excellent resting and feeding grounds for

shorebirds and seabirds (NOAA 2002). The coastal wetlands, lagoons, and bays are staging areas for large seasonal populations of waterfowl and shorebirds (ADF&G 2006). The Cook Inlet area is important for many species of shorebirds as a stopover site during migrations or as a wintering area; as many as 28 species have been identified in the area (Gill and Tibbitts 1999) (Table 4.3). These migrating shorebirds appear suddenly in the Cook Inlet area in early May, their numbers increase rapidly, and then they depart abruptly by late May. During this period, over 150,000 birds were counted per day (Gill and Tibbitts 1999).

**Table 4.3. List of shorebirds surveyed in the Cook Inlet area.**

Common Name	Scientific Name
Black-bellied Plover	<i>Pluvialis squatarola</i>
American Golden-Plover	<i>P. dominica</i>
Pacific Golden-Plover	<i>P. fulva</i>
Semipalmated Plover	<i>Charadrius semipalmatus</i>
Greater Yellowlegs	<i>Tringa melanoleuca</i>
Lesser Yellowlegs	<i>T. flavipes</i>
Solitary Sandpiper	<i>T. solitaria</i>
Whimbrel	<i>Numenius phaeopus</i>
Hudsonian Godwit	<i>Limosa haemastica</i>
Bar-tailed Godwit	<i>L. lapponica</i>
Marbled Godwit	<i>L. fedoa</i>
Ruddy Turnstone	<i>Arenaria interpres</i>
Black Turnstone	<i>A. melanocephala</i>
Surfbird	<i>Aphriza virgata</i>
Red Knot	<i>Calidris canutus</i>
Sanderling	<i>C. alba</i>
Semipalmated Sandpiper	<i>C. pusilla</i>
Western Sandpiper	<i>C. mauri</i>
Least Sandpiper	<i>C. minutilla</i>
Baird's Sandpiper	<i>C. bairdii</i>
Pectoral Sandpiper	<i>C. melanotos</i>
Rock Sandpiper	<i>C. ptilocnemis</i>
Dunlin	<i>C. alpina</i>
Ruff	<i>Philomachus pugnax</i>
Short-billed Dowitcher	<i>Limnodromus griseus</i>
Long-billed Dowitcher	<i>L. scolopaceus</i>
Common Snipe	<i>Gallinago gallinago</i>
Red-necked Phalarope	<i>Phalaropus lobatus</i>

Source: Gill and Tibbitts 1999

**a. Waterfowl**

***i. Steller's Eiders***

Steller's eiders, a species of sea duck, winter from the eastern Aleutian Islands to lower Cook Inlet. They make an annual migration from the Alaska Peninsula and Aleutian Islands, their wintering grounds, to the arctic coastal plain of northern Alaska and Russia, where they breed in the spring. They first breed at 2-3 years of age. They build nests on islands or peninsulas in tundra lakes and ponds near the coast. Steller's eiders feed by diving or dabbling in shallow water. Their primary food source is insect larvae from freshwater wetlands, but they will also eat aquatic plants. In marine habitats, they eat small fish and saltwater invertebrates. The USFWS listed the Steller's eider as threatened on June 11, 1997 because of apparent declines in abundance of nesting birds. Its population along the Alaska Peninsula has drastically declined since the 1960s for unknown reasons (ADF&G 2014a).

***ii. Trumpeter Swans***

Trumpeter swans are the largest waterfowl in North America. They are found in river wetlands, lakes, ponds, marshes, and open wooded areas (USFWS 2014a). Swans build nest sites in undisturbed marshes adjacent to small lakes in late March through early May. Young swans are unable to fly until 13 to 15 weeks of age (ADF&G 1985). After leaving the breeding areas in late summer and early fall, the swans congregate on ponds and marshes. They migrate south when temperatures start to drop in October and November (ADF&G 2014a). Trumpeter swans feed on wild celery and other freshwater plants, insects, snails, and invertebrates (ADF&G 1985). Censuses of Alaskan nesting habitats show that trumpeter swans have nested in the license area beginning in 1990, and their observed numbers there have increased with each subsequent census (up to the year 2005) even though researchers believed the Cook Inlet area swan habitat was saturated in 2000 (Conant et al. 2007).

**b. Raptors**

***i. Bald Eagles***

Bald eagles live and winter in Southcentral and Southeast Alaska, residing around coasts, offshore islands, and interior lakes and rivers. They tend to congregate along salmon-spawning streams and shorelines. Bald eagles nest in large trees or on rocky cliffs in April and May and fledge by the end of August. They usually use and rebuild the same nest each year. Their main food source is fish, including salmon, herring, flounder, and pollock, but they will also prey on waterfowl, small mammals, sea urchins, and crabs. Bald eagles are protected by the Bald Eagle Protection Act of 1940, which makes possession of an eagle, dead or alive, illegal (ADF&G 2014a). Bald eagles were removed from the federal list of threatened and endangered species on August 9, 2007 (USFWS 2014c).

**c. Landbirds**

***i. Olive-sided Flycatcher***

The olive-sided flycatcher breeds throughout Alaska in boreal forests, including those in the license area. An estimated 23% of the global population breeds in Alaska. Breeding season begins in late May to early June, with nests typically being built in spruce trees. Hatching occurs in mid-June and fledging in July. The birds begin their migration to their wintering grounds in South America in early August through early September. The olive-sided flycatcher feeds by aerial hawking large insects, including bees, wasps, and flying ants. Its Alaskan population had a 1% annual decline from 1982-2007, thought to be caused by rapid loss of forested habitats on their wintering grounds. It is listed by the BLM as a Sensitive Species because of its declining population (USFWS 2008).

***ii. Rusty Blackbird***

The rusty blackbird is a summer breeding resident of much of Alaska including the license area. They breed in boreal forests and prefer wet areas, including marshes and edges of ponds. Their primary food

source is insects. They migrate to the eastern U.S. for the winter months (Cornell Lab of Ornithology 2014). The rusty blackbird has experienced one of the steepest declines of any North American bird species. Over the last 15 years since 1995, the range-wide population has declined by 87-98%. There has been a 5% population decline per year in Alaska. Causes of the decrease in abundance are unknown (DOD 2010).

#### **d. Seabirds and Shorebirds**

The Cook Inlet region is also an important wintering area for many other bird species, including rock sandpipers, migrating western sandpipers and dunlin, and for breeding and migrating Hudsonian godwits, greater yellowlegs, solitary sandpipers, and short-billed dowitchers. Tidal flats are important to shorebirds, providing their bivalve food supply (Gill and Tibbitts 1999). Sandpipers overwinter and forage in winter on mudflats that are ice-free, generally occurring in lower Cook Inlet below Redoubt, Tuxedni, and Kachemak bays, and Homer Spit. There are many species of seabirds in the Cook Inlet area, including murre, gulls, kittiwakes, cormorants, murrelets, and puffins. Lower Cook Inlet is one of the most productive areas for seabirds in Alaska, with 2.2 million seabirds foraging in the area in July 1992 (Piatt 1994). Shallow coastal habitats are particularly important for seabirds at sea, as these areas have high densities of forage fish (Piatt and Roseneau 1997). Important food items include small fish, squid, and crustaceans such as krill and crabs (USGS 2014).

### **3. Mammals**

#### **a. Terrestrial Mammals**

Numerous terrestrial mammals inhabit the license area. Important species include moose, black and brown bears, and furbearers include wolf, beaver, red fox, coyote, wolverine, mink, muskrat, marten, and river otter. ADF&G manages and monitors wildlife in the license area, which is in game management subunit 9A.

##### ***i. Moose***

Moose are found in lowland and upland shrub communities and in winter, may concentrate along river drainages with shallow snow depths. They feed on willow, birch, shrub leaves, and pond vegetation. Moose calve from mid-May through early June. The males rut in late September and early October. Most moose move seasonally, from a few miles to 60 miles, among calving, rutting, and wintering areas (ADF&G 2014a). Moose density in game management subunit 9A is low. Surveys conducted from 2007 through 2009 estimate a population of 300 in the subunit (Butler 2010a).

##### ***ii. Brown and Black Bears***

Brown and black bears are solitary until mating season (ADF&G 2008). They hibernate in winter and emerge in spring when food is available. Dens may be found from alpine areas down to sea level (ADF&G 2014a).

Brown bears may congregate at salmon spawning streams in summer and fall (ADF&G 2008). They eat a wide variety of foods, including: berries, grasses, sedges, horsetails, cow parsnip, fish, squirrels, and roots. They also prey on moose, caribou, and carrion. Young cubs are born in January through February and emerge in June. Families may remain together for a few years. The mating season extends from May to July (ADF&G 2014a). Based on data gathered from 2008 through 2010, the Unit 9 brown bear population is stable, with a high density of one bear per 3.5 mi<sup>2</sup> (Riley and Butler 2011).

Black bears also have a varied diet, composed of green vegetation, small mammals, newborn moose and caribou, salmon, berries, ants, grubs, and insects (ADF&G 2008). Black bears may occur in higher densities along coastlines, which may be related to salmon runs and lower numbers of brown bears (ADF&G 2014a). Documented trends in black bear abundance in the license area are not available.

### ***iii. Furbearers***

Wolves are common across the state. They live in packs throughout a variety of habitats in exclusive, defended territories. Packs usually have 6-7 animals in them and include parents and the year's pups, but they can also fluctuate to include yearlings and other adults, up to 20-30 animals. Wolves generally have litters of seven pups per year (ADF&G 2014a). Based on data collected from 2005 through 2008, wolf density in Unit 9 is low to moderate; the unit population has increased since the 1990s and is estimated at 350 wolves. Due to the low moose population, wolves in the area feed upon salmon and marine mammal carcasses as alternative food sources (Butler 2009).

Numerous other furbearers can be found throughout the license area. For example, beaver are found in forested areas and live near and within fresh waters. They construct dams to secure dens used for food storage, rearing and shelter (ADF&G 2014a).

Red fox are present in the license area and can adapt to a wide range of habitats. They are omnivores and prey on voles, small mammals, birds, eggs, insects, vegetation, and carrion. Red fox build underground dens and bury and cache foods. They mate in February through March. A fox will normally birth a litter each year, and the family unit remains together until fall, when the animals live on their own (ADF&G 2014a).

Coyote are found throughout the Unit 9 mainland (Butler 2010b). They are opportunistic hunters and feed on snowshoe hares, voles, and carrion as well as on other small mammals, fish, birds, and insects. Coyote mate in January through March, and pups are born in spring. The male and female may remain in a territory. Coyote populations are reported to be fairly stable across their habitat range (ADF&G 2014a).

Wolverines are found on the Unit 9 mainland, but in lower densities than other furbearers (Butler 2010b). They have wide habitat ranges (up to 260 square miles). They are generally solitary and exhibit endurance in travel and foraging. Some have been found in higher elevations in summer and lower elevations in winter due to food availability. Mating occurs about February, and denning continues through July (ADF&G 2014a).

Mink live in burrows close to the water, such as saltwater beaches, lakeshores, and stream banks. They are omnivores and feed on fish, birds, eggs, insects, shellfish, and small mammals. They mate in March through April, and young kits are born in June (ADF&G 2014a).

Other small furbearers found in the license area include muskrat, marten, and river otter (ADF&G 2014a).

### **b. Marine Mammals**

Several marine mammals may be found in the license area, including beluga whales, fin whales, humpback whales, minke whales, blue whales, North Pacific right whales, sei whales, sperm whales, harbor and Dall's porpoises, harbor seals, Steller sea lions, and northern sea otters.

#### ***i. Cook Inlet Beluga Whales***

Cook Inlet beluga whales are a federally-listed endangered species, and the critical habitat designation area for the Cook Inlet beluga whale overlaps the license area (Figure 4.4) (NOAA 2013a). Estimates of the Cook Inlet beluga whale population from 2009 to 2011 were 321, 340, and 284 animals, respectively. The population trend from 2001 to 2011 shows an average estimated decline of 1.1 percent per year (Allen and Angliss 2012b).

Beluga whales are a medium-sized cetacean found in the Northern Hemisphere throughout Arctic and subarctic waters (NMFS 2008a). Cook Inlet belugas occur primarily in upper Cook Inlet, particularly in shallow, relatively warm, low-salinity water near river mouths (Moore et al. 2000; Hobbs et al. 2006; Hobbs et al. 2005; Goetz et al. 2007). In winter they are more dispersed but remain in the general

area (Moore et al. 2000). Breeding is believed to occur in late spring and early summer, and calves are born about fourteen months after mating. Mating periods and calving areas are poorly documented (ADF&G 2008; Hobbs et al. 2006). Belugas molt each summer, rubbing their bodies against the bottom in shallow areas to remove old skin. They travel in pods, surfacing simultaneously to breathe. These whales have well-developed echolocation, which they use to communicate, navigate, and hunt (ADF&G 2014a). Belugas are predators and consume a wide range of prey. Species found in stomachs of belugas in Cook Inlet include eulachon, salmon, walleye pollock, cod, flatfish, sculpin, crab, and shrimp (Hobbs et al. 2006).

**ii. Other Whales**

Several other whale species may be found near the license area. Of these, six are on the federal endangered species list: fin, humpback, blue, north Pacific right, sei, and sperm. The minke whale population is considered healthy and stable (NOAA 2013b). Other than the beluga whale, only the North Pacific right whales have designated critical habitat, outside the license area. North Pacific right whales are the most endangered of all large whales (ADF&G 2014a).

Minke whales feed in bays and shallow coastal waters in summer. Besides minke, fin and humpback whales are present in the waters surrounding the license area during the summer (ADF&G 2006). Baleen whales (fin, humpback, minke, blue, North Pacific right, and sei) feed primarily on krill, zooplankton, and small schooling fish. The sperm whale is a toothed whale and feeds mainly on squid but also fish, skates, and sharks (ADF&G 2014a). In the winter months, the fin, humpback, minke, blue, North Pacific right, sei, and sperm whales migrate to subtropical and temperate waters to mate and calve (NOAA 2013b).

**iii. Porpoises, Seals, Sea Lions, and Sea Otters**

Harbor porpoises are generally found in harbors, bays, and river mouths (MMS 2003; NMFS 2008c). Those found in Cook Inlet belong to the Gulf of Alaska stock, one of three stocks found in Alaska (Angliss and Outlaw 2008). Densities of harbor porpoises in Cook Inlet have been reported at 1.86 animals per square mile (MMS 2003, citing to Dahlheim et al. 2000). In 1991, an aerial survey estimated that 422 harbor porpoises inhabited Cook Inlet (Small and DeMaster 1995). Harbor porpoises make inshore-offshore seasonal movements that may be related to prey or ice conditions (NMFS 2008c). They feed on a wide variety of fish and cephalopods, particularly schooling fish such as herring, mackerel, and pollock (MMS 2003, citing to Leatherwood and Reeves 1987). Harbor porpoises can be found singly, in pairs, or in groups up to 10. Mating occurs in summer and births occur between May and July (NMFS 2008c).

Dall's porpoises are found in the North Pacific Ocean including Cook Inlet, usually in groups of between two and 20 individuals. They feed on schooling fish, cephalopods, and occasionally crabs and shrimp. They occur in offshore, inshore, and nearshore waters but are found in highest abundance near the shelf break. Dall's porpoises migrate as far north as the Bering Sea. The Alaskan stock is estimated to include 77,000-83,500 individuals and is considered reasonably robust (NOAA 2013a).

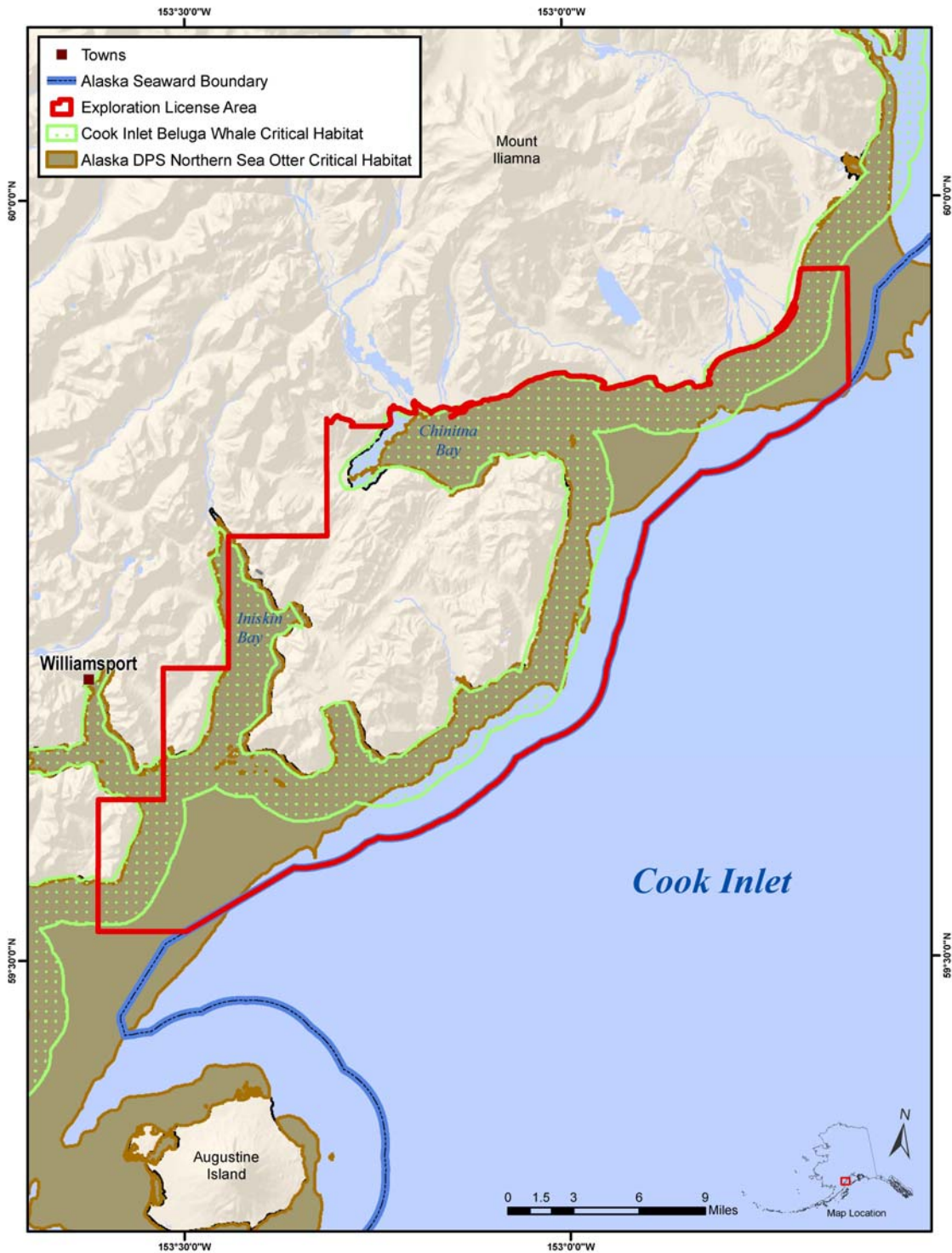
Harbor seals are found in the marine and estuarine waters of the Cook Inlet area but may be found seasonally in freshwater rivers and lakes (Angliss and Outlaw 2008; ADF&G 2008). They generally stay less than 15 miles from shore and usually do not migrate (Angliss and Outlaw 2008; ADF&G 2014a). They use haulouts to rest, give birth, nurse their pups, regulate body temperature, interact socially, and avoid predators (ADF&G 2008; NMFS 2008b). Harbor seals have a strong tendency to return to the same haulout sites in June and July, when pups are born (Angliss and Outlaw 2008). Their haulout areas include rocks, reefs, beaches, and drifting glacial ice (Angliss and Outlaw 2008). Within the license area, the mouths of Clearwater and Chinitna Creek, near Pomeroy and Iniskin Islands, and areas in Oil Bay are known harbor seal haulouts (DNR 2001). They molt between June and October and are especially vulnerable to disturbance during this time (ADF&G 1985). Harbor seals feed on

walleye pollock, Pacific cod, capelin, eulachon, Pacific herring, salmon, octopus, and squid (ADF&G 2008).

Steller sea lions found in the Cook Inlet area belong to the western stock (NMFS 2008e). The Western DPS is a federally-listed endangered species, but its critical habitat does not include the license area (NMFS 2007). Based on surveys between 2008 and 2011, the minimum population estimate for the western US stock of Steller sea lions is 45,916. Rookeries, used for breeding and giving birth in June, are usually found on remote island beaches and vary from expanses across low-lying reefs and islands to narrow strips of beach by steep cliffs. Haulouts, used by adults during the non-breeding season, include rookery areas as well as rocks, reefs, beaches, jetties, breakwaters, navigational aids, floating docks, and sea ice (NMFS 1992). Steller sea lions feed from the intertidal zone to the continental shelf and eat a wide variety of fish, including: pollock, flounder, herring, capelin, Pacific cod, salmon, rockfish, sculpin, and invertebrates such as squid and octopus (ADF&G 2008).

Northern sea otters (Southwest Alaska DPS) are listed as threatened under the Endangered Species Act and critical habitat has been designated in the license area (Figure 4.4) (USFWS 2010). They occur in Southcentral Alaska and are found in low densities in lower Cook Inlet habitats (Angliss and Outlaw 2008). In 2002, the abundance of sea otters in lower Cook Inlet and the Kenai Fjords was estimated to be 2,673 animals. The overall trend for the Southcentral stock (Southwest Alaska DPS), which includes Cook Inlet, appears to be stable or slightly increasing, and the population in lower Cook Inlet and the Kenai Fjords also appears to be increasing slightly (Angliss and Outlaw 2008). Sea otters are generally not migratory. They breed throughout the year, but in Alaska most pups are born in late spring. The pup is weaned at 3-6 months when it weighs approximately 30 pounds, almost the same size as its mother (ADF&G 2014a). Northern sea otters feed on sea urchins, crabs, clams, mussels, octopus, other marine invertebrates, and fish (ADF&G 2008).





**Figure 4.3. Portions of federal critical habitat designations of the Cook Inlet beluga whale and Southwest Alaska DPS of the northern sea otter that overlap the license area.**

Sources: DEC 2014, NOAA 2014

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